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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
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**[Document Name] Description**

**[Title of the Invention]** A formula hydraulic lifter with a built-in accumulator, and the hydraulic elevator using it

**[Claim(s)]**

**[Claim 1]** the hydraulic lifter (5 and 5A --) which resists the load which acts on the ram (17, 17A, 17B) inserted in the cylinder tube (15), and elongates Lamb with the pressure oil from the source of oil pressure (37) The formula hydraulic lifter with a built-in accumulator which establishes the accumulator room (As, Ar, Asa, Ara and Ams, and Amr) which stores the compression gas which acts on Lamb's rise and fall in Lamb's inner direction and by which are 5B and 5D, and it is thing characterized.

**[Claim 2]** As for said accumulator (12, 12A), an end part is fixed to the end face board (13) of a cylinder tube (15). And the other end is equipped with the hollow pipe (27) connected to the hollow piston (29) inserted in Lamb's inside diameter. The formula hydraulic lifter according to claim 1 with a built-in accumulator characterized by an accumulator room (As, Ar, Asa, and Ara) consisting of Lamb's (17, 17A) space room (Ar, Ara), and an inside diameter room (As, Asa) of a hollow pipe (27, 27A).

**[Claim 3]** The hollow pipe by which said accumulator (12B, 12D) has been arranged by this heart in the inner direction of Lamb (17B) who has a lid (25A), and the end part was connected at least to Lamb (48, 48A), The disk (49, 49A) which connects Lamb and a hollow pipe, and an end part are fixed to the end

face board (13) of a cylinder tube (15). And the other end is equipped with the rod (46) connected to the piston (47) inserted in Lamb's inside diameter. The formula hydraulic lifter according to claim 1 with a built-in accumulator characterized by an accumulator room (Ams and Amr) consisting of a space room (Amr) between Lamb's inside diameter, the outer diameter of a hollow pipe, and a disk, and an inside diameter room (Ams) which consists of space of the upper part a piston's, a hollow pipe inside diameter, and Lamb's lid.

[Claim 4] Supply pressure oil to a hydraulic lifter (5) from the source of oil pressure (37), and pressure oil is discharged from a hydraulic lifter to an oil tank (40). It is the hydraulic elevator (1) which resists the load of the basket (3) concerning Lamb (17) inserted in the cylinder tube (15), and makes it go up and down a basket. The oil pressure led to the cylinder tube from the source of oil pressure, and the accumulator room established in Lamb's inner direction ([ As / Ar and ]) Expand Lamb with the compression gas of Asa, Ara, Ams, and Amr, and a basket is gone up. And the hydraulic elevator using the formula hydraulic lifter with a built-in accumulator characterized by making Lamb reduce with the compression gas of the accumulator interior of a room compressed, and the return pressure oil to the oil tank out of a cylinder tube discharged while being controlled, and making a basket come to descend.

[Claim 5] The lid which is attached in the accumulator room bottom free [ attachment and detachment ], and seals compression gas (25, 25A), It has the Lamb part (17, 50, 50A) in which the lid concerned is attached, and the piston (29, 47) of the compression gas which countered said lid and was arranged. The hydraulic elevator using the formula hydraulic lifter according to claim 4 with a built-in accumulator characterized by the inside diameter size of the Lamb part (17, 17A, 50, 50A) being more than the outer diameter size of a piston (29, 47).

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the hydraulic elevator which used a formula hydraulic lifter with a built-in accumulator, and it, and a setting position is especially related with the hydraulic lifter used for the hydraulic elevator and it which are used for small home use or a small small building etc.

[0002]

[Description of the Prior Art] As the hydraulic lifter 70 used for the source of a drive etc. is conventionally shown in drawing 6, for example, Lamb 73 is projected from the cylinder tube 71, and this Lamb 73 is connected to the load 75. It connects with the oil pressure pump 81 through the control valve 77, and cylinder CHUPU 71 receives that cylinder CHUPU 71 was controlled by the control valve

77 in the pressure oil breathed out from the oil pressure pump 81, it elongates Lamb 73 inserted and is going up the load 75.

[0003] In the composition of drawing 6, when dropping a load 75, the hydraulic lifter 70 is discharged as it is by the tank 83, as the pressure oil in a cylinder tube 71 shows by a dotted line through a control valve. For this reason, the oil pressure generated with a load 75 is consumed vainly as it is, without being used. [ the former ] when dropping a load 75 in order to improve this fault The pressure oil produced in a cylinder tube 71 accumulates pressure through other change-over valves Va to the air type accumulator 85 which is shown according to a two-dot chain line and by which the separate type was carried out. When this pressure oil raises the following load 75, generally by supplying a cylinder tube 71 from the air type accumulator 85, using the hydraulic lifter 70 aiming at energy saving is performed.

[0004]

[Problem to be solved by the invention] however, [ the above-mentioned conventional hydraulic lifter ] Since the separate type of the air type accumulator is carried out, while piping which connects a hydraulic lifter and an air type accumulator is needed, in order to switch the pressure accumulation and supply between a hydraulic lifter and an air type accumulator, the control means which switches a change-over valve Va and it further is needed. For this reason, since piping, a change-over valve Va, etc. are needed, there is a problem that the cost of equipment increases further. Moreover, use in the place where only the setting position which the space for installing an air type accumulator was needed, and required the large setting position, for example, was restricted like the hydraulic lift is obtained is difficult.

[0005] In recent years, the hydraulic elevator is installed also in ordinary homes more often. As for such a hydraulic elevator, it is necessary for beyond predetermined loading load to have the elevating length more than predetermined elevating speed and more than fixed, and the predetermined drive energy according to specs is needed, respectively. Moreover, a hydraulic elevator has a small noise generated from an electric motor, hydraulic equipment, etc. which drive it while being able to install in narrow space, and to be energy saving is desired. For this reason, by using high-pressure hydraulic equipment, such as a \*\*\*\* form used conventionally or an inclined shaft type oil pressure pump, an outside becomes possible [ being able to do small and installing in narrow space ]. However, in order to adjust extracting high pressure by a flow control valve etc. in order to control downward speed at predetermined speed at the time of the noise of the hydraulic equipment for generating high pressure at the time of a rise, and descent, noise becomes high and the problem of being unable to be satisfied with a request arises.

[0006] Moreover, [ if low-pressure hydraulic equipment, such as a screw pump, is used, noise can be made to a low numerical value and can satisfy a request, but ] Since oil pressure is low, it will be necessary to enlarge the diameter of a cylinder, the amount of discharge of a pump must be enlarged obtaining predetermined speed for this reason, the appearance form of a cylinder and a pump becomes

large and the problem of installation becoming impossible at a narrow place arises. Moreover, since a lot of [ in order to control at predetermined speed ] return oil is extracted at the time of descent and flux is controlled, useless quantity of heat has occurred and the equipment which needs heat dissipation, for example, the cooling device in an oil tank, a tank with a cooling fin, etc. are needed. For this reason, while equipment becomes large, the problem that the cost of equipment increases arises. Furthermore, since a hydraulic elevator is installed in a narrow place in many cases, improvement in maintainability is desired strongly. When an accumulator is used especially, check of a seal, packing, etc. and development of a formula hydraulic lifter with a built-in accumulator with easy exchange are desired from the upper part.

[0007] When this invention was made paying attention to the above-mentioned problem and the 1st purpose builds in an accumulator, while being able to make small hydraulic equipment to be used, and being able to make installation area small and being able to make noise low, the formula hydraulic lifter with a built-in accumulator which can attain energy saving is offered. The 2nd purpose aims to let check and maintenance offer the hydraulic elevator using an easy and inexpensive formula hydraulic lifter with a built-in accumulator also at the place where installation area is narrow.

[0008]

[Means for solving problem] In order to attain the above-mentioned purpose, [ invention of a formula hydraulic lifter with a built-in accumulator ] It is the hydraulic lifter which resists the load which acts on Lamb inserted in the cylinder tube, and elongates Lamb with the pressure oil from the source of oil pressure, and has composition which establishes the accumulator room which stores the compression gas which acts on Lamb's rise and fall in Lamb's inner direction. In this case, said accumulator is equipped with the hollow pipe connected to the hollow piston by which the end part was fixed to the end face board of a cylinder tube, and the other end was inserted in Lamb's inside diameter, and he is trying for an accumulator room to consist of Lamb's space room and an inside diameter room of a hollow pipe. Or the hollow pipe by which said accumulator has been arranged by this heart in the inner direction of Lamb who has a lid, and the end part was connected at least to Lamb, The disk which connects Lamb and a hollow pipe, and an end part are fixed to the end face board of a cylinder tube. And the other end is equipped with the rod connected to the piston inserted in Lamb's inside diameter, and you may make it an accumulator room consist of a space room between Lamb's inside diameter, the outer diameter of a hollow pipe, and a disk, and an inside diameter room which consists of space of the upper part a piston's, a hollow pipe inside diameter, and Lamb's lid. [ invention of the hydraulic elevator using this formula hydraulic lifter with a built-in accumulator ] Supply pressure oil to a hydraulic lifter from the source of oil pressure, and pressure oil is discharged from a hydraulic lifter to an oil tank. It is the hydraulic elevator which resists the load of the basket concerning Lamb inserted in the cylinder tube, and makes it go up and down a basket. Expand Lamb with the compression gas of the oil pressure led to the cylinder tube from the source of oil pressure, and the accumulator room established in Lamb's inner direction, and a basket is gone up. And Lamb is made to reduce with the compression gas of the accumulator interior of a room compressed, and the return pressure oil to the oil tank out of a cylinder tube

discharged while being controlled, and it has composition to which make a basket come to descend. In this case, it has the lid which is attached in the accumulator room bottom free [ attachment and detachment ], and seals compression gas, the Lamb part in which the lid concerned is attached, and the piston of the compression gas which countered said lid and was arranged, and is made for the inside diameter size of the Lamb part to be more than the outer diameter size of a piston.

[0009]

[Function] Since the hydraulic lifter by the above-mentioned composition has established the actuator room which stores compression gas in the inner direction of Lamb inserted in the cylinder tube, piping, a control means, etc. can become unnecessary and it can make compression gas act on a hydraulic lifter continuously with an easy structure. Since compression gas is acting on Lamb continuously, the oil pressure and \*\*\*\* which supply only the part of the applied force of gas pressure power which acts on this Lamb from the oil pressure pump which raises load can be made small. Moreover, as for the oil returned to an oil tank from a hydraulic lifter, only the part whose \*\*\*\* to supply has decreased can lessen \*\*\*\* of return. For this reason, when going up a load, only oil pressure and a part with small \*\*\*\* can make drive torque small, and can aim at the miniaturization of hydraulic equipment, and the fall of noise. Moreover, when controlling downward speed, the flux of the pressure oil extracted by a flow control valve etc. decreases, and generating of useless heat can be lessened.

[0010] Since compression gas will act on Lamb continuously if this formula hydraulic lifter with a built-in accumulator is used for a hydraulic lift, When resisting the load which acts on Lamb and going up Lamb, since the discharge pressure oil from an oil pressure pump can make discharge capacity small again at low pressure only as for the part of the compression gas which acts on Lamb, an oil pressure pump can be made small, and a hydraulic elevator can be installed in narrow space. Moreover, it can also lessen an iris diaphragm of the return pressure oil to an oil tank, and can make generating of heat small while it can make noise of an oil pressure pump low, since the discharge pressure of the oil pressure pump is low pressure. Furthermore, an oil pressure pump is low pressure, since discharge capacity can be made small, can make the source of a drive small and can attain energy saving. Therefore, noise can also be made still smaller while being able to attain a miniaturization, even if it uses the conventional screw pump. Since the compression gas of a formula hydraulic lifter with a built-in accumulator goes up according to Lamb's descent also when it extracts with garbage etc. and an operation cannot function while a hydraulic lift descends, Lamb's descent can be made late with compression gas, and the buffer for fall prevention can be made small. Since the piston outer diameter size of compression gas is smaller than the inside diameter of the Lamb part which attaches the head for Lamb which seals compression gas when this formula hydraulic lifter with a built-in accumulator is used for a hydraulic elevator It is easily exchangeable by checking the seal of the piston which counters by removing the head for Lamb, and packing. Moreover, since it is supported with the rail to which Lamb shows a cylinder tube and a basket, while position \*\*\*\* of Lamb and a rail becomes easy, the axle hole is unnecessary at Lamb.

[0011]

[Mode for carrying out the invention] The embodiment of the hydraulic elevator using the formula hydraulic lifter with a built-in accumulator and it concerning this invention is hereafter explained with reference to Drawings. First, drawing 1 explains the 1st embodiment of the hydraulic elevator using a formula hydraulic lifter with a built-in accumulator. In drawing 1, the 1st oil elevator 1 is formed by the basket 3 of an elevator, the formula hydraulic lifter 5 (henceforth the 1st hydraulic lifter 5) with 1st built-in accumulator, and the hydraulic system 7. Below, when the 1st hydraulic lifter 5 uses for the hydraulic elevator 1 on the right of the center of illustration, and when left-hand side is used with the hydraulic jack of other uses, the convenient example is shown. Below, the case where the 1st hydraulic lifter 5 is mainly used for the hydraulic elevator 1 is explained.

[0012] The basket 3 of the elevator is attached in the basket frame 3a, and the basket frame 3a is guided to a pair of rails 3d arranged in the side of a basket 3 with the roller 3b attached to the basket frame 3a, and it goes up and down it with Lamb's 17 elasticity. It screws and connects with the screw which was inserted and fixed to the hole 3e for the Lamb attachment established in the basket frame 3a, or was formed in the basket frame 3a and which is not illustrated so that it may illustrate, and Lamb 17 has told Lamb's 17 elasticity to the basket frame 3a. Or you may constitute so that a basket 3 may be hung by the wire and pulley which are not illustrated and it may go up and down a basket 3 according to Lamb's 17 guided rise and fall. The whole weight is set up with the weight of the man and the load with which a basket 3 boards into prudence of a basket 3, and a basket etc.

[0013] The 1st cylinder of the 1st hydraulic lifter 5 is formed by 11 and the 1st accumulator 12. 11 [ cylinder / 1st ] is constituted by the end face board 13, a cylinder tube 15, Lamb 17, and the seal 19 for Lamb. 11, the 1st cylinder of the cylinder tube 15 is fixed to the upper surface side of the end face board 13. This 1st cylinder 11 may be made to be attached free [ decomposition ], as shown in drawing 5. The feeding-and-discarding hole 21 which connects with the end face board 13 at the hydraulic system 7, and carries out the feeding and discarding of the pressure oil is formed, and this feeding-and-discarding hole 21 is open for free passage in the oil pressure room Hs. As shown in drawing 3, this feeding-and-discarding hole 21 opens in a cylinder tube 15 at the upper surface close-attendants side of the end face board 13, and you may make it open for free passage [ hole ] in the oil pressure room Hs.

[0014] moreover -- the hole 23 for Lamb is opened in the other end side of a cylinder tube 15 -- the hole 23 for Lamb -- \*\* -- Lamb 17 inserted densely is supported free [ sliding ]. The seal 19 for Lamb which prevents the leak of pressure oil in contact with Lamb 17 who can slide freely is formed in the hole 23 for Lamb by the side of the other end of a cylinder tube 15. The oil pressure room Hs is formed in the space where 11 [ cylinder / 1st ] consists of an outer diameter 27a of the hollow pipe 27 mainly fixed to the inside diameter part 15a and the end face board 13 mentioned later of a cylinder tube 15, and the oil pressure room Hs is connected to the hydraulic system 7 through the feeding-and-discarding hole 21.

[0015] The 1st accumulator 12 is constituted by the end face board 13, Lamb 17, a lid 25, the seal 26 for lids, the hollow pipe 27, the hollow piston 29, the 1st seal 31 for pistons, the 2nd seal 32 for pistons, and the bolt 33 for pistons. In this case, since Lamb 17 is supported at close cylinder tube 15 and hollow piston 29, some gap may produce him in a horizontal direction. However, in a hydraulic elevator, as mentioned above, it is supported and shown to the roller 3b attached to the basket frame 3a to the basket 3 with Rail 3d, and a basket 3 goes up and down it along with Rail 3d, without shifting to right and left.

[0016] Lamb's 17 upper end is connected with the basket frame 3a as mentioned above, without shifting, since it is supported in the distant position of the basket frame 3a and a cylinder tube 15, and the hollow piston 29, it is stabilized and Lamb 17 goes up and down. Since the gap permitted in the horizontal direction produces Lamb 17, in a hydraulic elevator, Lamb 17 and the axle hole later mentioned while connection to 3 becomes easy become unnecessary by gap, and structure becomes easy. Or when it uses for the hydraulic jack of other uses, as for Lamb 17, sliding of the up-and-down direction is supported with the hollow pipe 27 by adding and arranging an axle hole 34 between Lamb's 17 inside diameter 17a, and the outer diameter 27a of the hollow pipe 27. For this reason, since his rigidity increases while Lamb 17 goes up and down without shifting to a horizontal direction, use with the hydraulic jack of other uses is attained.

[0017] For Lamb 17, a section is formed of inverted-U character form, and the basket 3 of the elevator is carried above the lid 25 of the tip part. Between Lamb 17 and a lid 25, the seals 26 for lids, such as O ring and packing, are arranged, the Lamb part is constituted, and the seal of the compression gas poured in into the 1st accumulator 12 leaking to the open air is carried out. The inside diameter size Da of Lamb 17 who is the Lamb part which attaches a lid 25 is formed more than the outer diameter size Db of the hollow piston 29 which counters. Lamb 17 is having it supported that the hollow piston 29 which can be freely detached and attached to the hollow pipe 27 is inserted in the inside diameter 17a of the lower part position of the hole 23 for Lamb again at the hole 23 for Lamb, and the outer diameter 17b slides in the up-and-down direction.

[0018] While the hollow pipe 27 is attached at the tip (on illustration) free [ attachment and detachment of the hollow piston 29 ] with the bolt 33 for pistons, the other end side (under illustration) is fixed to the upper surface side of the end face board 13. The hollow piston 29 is inserted in the hollow disk 30 fixed at the tip of the hollow pipe 27 by welding etc., and is attached free [ attachment and detachment of the hollow piston 29 ] with the bolt 33 for pistons. The 1st seal 31 for pistons is inserted between Lamb's 17 inside diameters 17b, and the 2nd seal 32 for pistons is inserted between the hollow disks 30, and the hollow piston 29 is carrying out the seal of the compression gas poured in into the 1st accumulator 12 leaking to the oil pressure room Hs.

[0019] The 1st accumulator 12 mainly arranges in Lamb's 17 inner direction the accumulator room formed from the space room Ar of Lamb's 17 inside diameter part, and the inside diameter room As of a hollow pipe, and compression gas is enclosed with the space room Ar of this accumulator room, and the inside diameter room As. Concretely, by the 1st embodiment, the space room Ar is the space of Lamb's



17 inside diameter 17a, the bottom 25a of a lid 25, and upper part 29a of the hollow piston 29, and the inside diameter room As is formed of the space of the inside diameter 27b of the hollow pipe 27, and the inside diameter 30a of the hollow disk 30. Said compression gas is enclosed with the accumulator room by predetermined pressure (from 2MPa to for example, 7MPa), and inactive gas, such as nitrogen gas, acts all over Lamb's 17 inside diameter 17a 25a, i.e., the bottom of a lid 25, and is pushing up it above illustration of Lamb 17. Although this compression gas is changed by elasticity of the 1st accumulator 12, since the capacity of the space room Ar and the inside diameter room As is large, it can make small pressure variation in the time of the maximum reduction of Lamb 17 of the 1st accumulator 12, and the maximum extension.

[0020] the lid 25 with which the 1st above-mentioned hydraulic lifter 5 counters the hollow piston 29 -- and By removing the bolt 33 for pistons from the upper part, the hollow piston 29 is taken out upwards, check of the 1st seal 31 for pistons used for the seal 26 for lids and the hollow piston 29 and the 2nd seal 33 for pistons and exchange can carry out easily, and maintainability improves. Especially in the hydraulic elevator in which the 1st hydraulic lifter 5 is installed in a narrow place, since maintenance can be performed from the upper part, check and exchange become easy.

[0021] The hydraulic system 7 is formed by the electric motor 36, the oil pressure pump 37, the control valve 38, and the oil tank 40. The electric motor 36 drives the oil pressure pump 37, and carries out discharge of the pressure oil. It connects with the control valve 38, the 1st cylinder of the breathed-out pressure oil is supplied to the oil pressure room Hs of 11 through the feeding-and-discarding hole 21, and the oil pressure pump 37 is elongating Lamb 17. At this time, it elongates in response to the pressure oil from the oil pressure pump 37, and the compression gas in Lamb 17, and Lamb 17 goes up the basket 3 of the hydraulic elevator 1. Since compression gas is acting on Lamb 17 continuously and the capacity can also be made small while only the part can make small pressure receiving area of said oil pressure room Hs, the oil pressure pump 37 can make discharge capacity small, can attain a miniaturization and can make driving force small.

[0022] The flow control valve 42 is formed in the control valve 38 at the return pipeline 41 to the oil tank 40. This flow control valve 42 is controlled by pressure oil decided by weight of the 1st oil elevator 1, passes fixed return flux, and fixes downward speed of the basket 3. Thereby, flux is controlled by the flow control valve 42 of the control valve 38 through the feeding-and-discarding hole 21, and, as for the 1st oil elevator 1, the return pressure oil of the oil pressure room Hs descends at a fixed speed. While the return pressure oil produced by Lamb 17 receives the compression gas in Lamb 17 at this time, in order to descend, return pressure oil of the oil pressure room Hs is low-pressure-ized by the pressure of compression gas.

[0023] In addition, although the flow control valve 42 controlled the return pressure oil from the control valve 38, it may prepare the circuit which returns from the oil pressure room Hs to the oil tank 40 soon, and may form the flow control valve 42 in it, and prepares an electromagnetism change-over valve and a variable iris diaphragm valve in this circuit, and you may make it control it by the above-mentioned



work example.

[0024] Next, the operation of the 1st oil elevator 1 is explained. When going up the 1st oil elevator 1, the electric motor 36 and the oil pressure pump 37 which this drives are rotated by instructions of the switch for a rise which is not illustrated, and discharge of the pressure oil is carried out. Pressure oil has a direction controlled by the control valve 38, and is supplied to the oil pressure room Hs of 11 the 1st cylinder through the feeding-and-discarding hole 21. The pressure oil supplied to the oil pressure room Hs acts on Lamb's 17 pressure receiving area with the compression gas in Lamb 17, elongates Lamb 17, and goes up the basket 3 of the hydraulic elevator 1. The oil pressure according to the weight of the basket 3 which the compression gas which acts on Lamb 17 at this time requires for Lamb 17 although the pressure of Lamb's 17 space room Ar and the inside diameter room As declines one by one according to Lamb's 17 extension is breathed out by the oil pressure room Hs from the oil pressure pump 37. By this, the pressure of oil pressure and compression gas is added according to the weight of a basket 3, it becomes fixed power, and the basket 3 is raised.

[0025] Since compression gas is acting on Lamb 17 continuously like the above, the 1st oil elevator 1 can make small the oil pressure and \*\*\*\* which are supplied from the oil pressure pump 37 which raises a basket 3. The miniaturization of the electric motor 36 which drives the oil pressure pump 37 and it can be performed by this, and noise can be reduced while being able to attain energy saving of the oil pressure pump 37 and the electric motor 36, since the driving force can be reduced. Moreover, since the oil pressure pump 37 and the electric motor 36 are miniaturized, the 1st oil elevator 1 can be installed in a narrow place.

[0026] When descending the 1st oil elevator 1, the control valve 38 is operated in a downward position by instructions of the switch for descent which is not illustrated. The 1st cylinder, the pressure oil of the oil pressure room Hs of 11 returns to the flow control valve 42 through the feeding-and-discarding hole 21 and the control valve 38, and flows as pressure oil. When the amount of openings is controlled according to the pressure of return pressure oil and the flow control valve 42 returns fixed flux to the oil tank 40, flux is controlled and Lamb 17 descends at a fixed speed. While the return pressure oil produced by this Lamb 17 receives the compression gas in Lamb 17, in order to descend, return pressure oil of the oil pressure room Hs is low-pressure-ized by the pressure of compression gas, and the oil pressure adjusted by the flow control valve 42 has low pressure. When the flow control valve 42 controls low pressure, while being able to reduce the noise at the time of adjustment, generation of heat can be reduced.

[0027] Therefore, when using high pressure, the necessity for heat dissipation is lost, and it becomes possible to make the oil tank 40 small, and the 1st oil elevator 1 can be installed in a narrow place. Moreover, since compression gas goes up with Lamb's 17 descent even if the flow control valve 42 becomes a poor operation with garbage etc., Lamb's 17 descent can be made late with compression gas, and the buffer for fall prevention can be made small. Thereby, the setting position of the 1st oil elevator 1 can be made small.

[0028] Next, drawing 2 explains the 2nd embodiment of a hydraulic elevator. In addition, the same mark is given to the same functional component as the 1st embodiment, and explanation is omitted. Moreover, the explanation about support of a basket 3 is also omitted. The 2nd oil elevator 1A shown in drawing 2 is formed by the basket 3 of an elevator, the formula hydraulic lifter 5A (henceforth the 2nd hydraulic lifter 5A) with 2nd built-in accumulator, and the hydraulic system 7. Since the 2nd oil elevator 1A differs in the 2nd hydraulic lifter 5A, below, it mainly explains the 2nd hydraulic lifter 5A.

[0029] The 2nd cylinder of the 2nd hydraulic lifter 5A is formed by 11A and the 2nd accumulator 12A. Cylinder [ 2nd ] 11A is constituted by the end face board 13, a cylinder tube 15, 1st Lamb 17A, and the seal 19 for Lamb.

[0030] The oil pressure room Hsa is formed in the space where 11 [ cylinder / 1st ] mainly consists of an inside diameter part 15a of a cylinder tube 15, and 1st Lamb's 17A outer diameter part 17b, and the oil pressure room Hsa is connected to the hydraulic system 7 through the feeding-and-discarding hole 21. The 2nd accumulator 12A is constituted by the end face board 13, 1st Lamb 17A, the 1st hollow pipe 27A, and the 3rd seal 31A. For 1st Lamb 17A, the section is formed of the shape of U type. 1st Lamb 17A -- the outer diameter part 17b -- the hole 23 for Lamb -- moreover, the lower end inside diameter part 17e -- the outer diameter part 27a of the 1st hollow pipe 27A -- \*\* -- it is inserted densely and the up-and-down direction is supported, enabling free sliding. As for the 1st hollow pipe 27A, the other end is fixed to the upper surface side of the end face board 13 while 27d (on illustration) is opened wide as for the tip side. The 1st hollow pipe 27A which supports 1st Lamb 17A free [ sliding ] in 1st Lamb's 17A lower end inside diameter part 17e is contacted, and the 3rd seal 31A which prevents the leak of pressure oil and compression gas is formed.

[0031] The 1st accumulator 12 mainly The inside diameter room Asa of the 1st hollow pipe 27A, And it has the accumulator room formed from the space room Ara formed of the outer diameter part 27a of the 1st hollow pipe 27A, and 17d of 1st Lamb's 17A inside parts, and compression gas is enclosed with the inside diameter room Asa of this accumulator room, and the space room Ara.

[0032] Next, although the operation of the 1st oil elevator 1 is explained, only a difference with the 1st embodiment is described. When going up the 2nd oil elevator 1A, pressure oil has a direction controlled by the control valve 35, and is supplied to the oil pressure room Hsa of 11A the 2nd cylinder through the feeding-and-discarding hole 21. The pressure oil supplied to the oil pressure room Hsa acts on Lamb 17 with the compression gas in Lamb 17, elongates Lamb 17, and goes up the basket 3 of the hydraulic elevator 1. When descending, the pressure oil of the oil pressure room Hsa of 11A returns to the flow control valve 41 through the feeding-and-discarding hole 21 and the control valve 35, and flows through the 2nd cylinder of the 2nd oil elevator 1A as pressure oil. When the amount of openings is controlled according to the pressure of return pressure oil and the flow control valve 41 returns fixed flux to the oil tank 37, flux is controlled and Lamb 17 descends at a fixed speed.

[0033] Next, drawing 3 explains the 3rd embodiment of a hydraulic elevator. In addition, the same mark is given to the same functional component as the 1st embodiment, and explanation is omitted. The 3rd oil elevator 1B shown in drawing 3 is formed by the basket 3 of an elevator, the formula hydraulic lifter 5B (henceforth the 3rd hydraulic lifter 5B) with 3rd built-in accumulator, and the hydraulic system 7. Since the 3rd oil elevator 1B differs in the 3rd hydraulic lifter 5B, below, it mainly explains the 3rd hydraulic lifter 5B.

[0034] The 3rd cylinder of the 3rd hydraulic lifter 5B is formed by 11B and the 3rd accumulator 12B. Cylinder [ 3rd ] 11B is constituted by the end face board 13, a cylinder tube 15, the Lamb member 45, the seal 19 for Lamb, a rod 46, a piston 47, the 1st seal 31 for pistons, the 2nd seal 32 for pistons, and the bolt 33 for pistons. Cylinder [ 3rd ] 11B is fixed to the upper surface side of the end face board 13 with which a cylinder tube 15 forms a cylinder tube 15. The Lamb member 45 is formed from the disk 49 which connects 2nd Lamb 17B, 2nd Lamb 17B, the 2nd hollow pipe 48 and 2nd Lamb 17B that were arranged in the inner direction by this heart, and the 2nd hollow pipe 48 in an end part (illustration lower part). When using by a hydraulic lift, the hole 49a which goes oil in and out is opened in the disk 49. Or when using in an oil pressure cylinder, the hole 49b which goes an axle hole 34 and oil in and out is opened.

[0035] While a end face part is fixed to the end face board 13, as for the arranged rod 46 of the inner direction of the Lamb member 45, the piston 47 is attached in the other end free [ attachment and detachment ] with the bolt 33 for pistons. The piston 47 is inserted in the inside diameter 48a of the 2nd hollow pipe 48 of the Lamb member 45. The 1st seal 31 for pistons is inserted between the 2nd hollow pipes 48, and the 2nd seal 32 for pistons is inserted between rods 46, and the piston 47 is carrying out the seal of the compression gas poured in mainly into the 3rd accumulator 12B leaking to the oil pressure room Hm. Moreover, the seal is carried out so that the 3rd cylinder of the pressure oil of 11B may not leak in the 3rd accumulator 12B on the contrary.

[0036] In the 2nd embodiment, the oil pressure room Hm The space Hma of the inside diameter 15a a cylinder tube's 15, and 2nd Lamb's 17B outer diameter 17b, It is formed from the space Hmc between the inside diameter 48a of the space Hmb of the bottom of a disk 49, and the upper surface of the end face board 13, and the 2nd hollow pipe 48, the outer diameter of a rod 46, the bottom of a piston 47, and the upper surface of a disk 49.

[0037] As for the 3rd accumulator 12B, space room Amr mainly reaches between 2nd Lamb 17B and the 2nd hollow pipe 48. The accumulator room which consists of an inside diameter room Ams between the upper part of a piston 47, the inside diameter 48a of the 2nd hollow pipe 48, and the 1st lid 25A is arranged in 2nd Lamb's 17B inner direction, and compression gas is enclosed. In the 2nd embodiment, the space room Amr is the space between 2nd Lamb's 17B inside diameter 17a, and the outer diameter 48b of the 2nd hollow pipe 48 concretely. Moreover, the inside diameter room Ams is formed of the

space between the upper surface of a piston 47, the hole 50a of the head 50 for Lamb, the inside diameter 48a of the hollow pipe 48, and the bottom 25a of the 1st lid 25A. [ the space room Amr of this accumulator room, and the inside diameter room Ams ] like the 1st embodiment Compression gas is enclosed by predetermined pressure, and the pressure receiving surface integral equivalent to the outer diameter of a piston 47 acts on 2nd Lamb's 17B inside diameter 17a 25a, i.e., the bottom of the 1st lid 25A, and is pushing up the Lamb member 45 above illustration.

[0038] The 1st lid 25A which is the Lamb part is screwed in 2nd Lamb 17B through the head 50 for Lamb. The seal 51 for the 1st lid is inserted between the 1st lid 25A and the head 50 for Lamb, and the seal of compression gas leaking outside is carried out. The inside diameter size Da of the hole 50a of the head 50 for Lamb which attaches the 1st lid 25A which is the Lamb part is opened above the outer diameter size Db of the piston 47 currently arranged face to face. Although this 1st lid 25A and the head 50 for Lamb may be formed by one, they make attachment and detachment of the lid easy by dividing.

[0039] the 1st lid 25A to which the 3rd accumulator 12B counters a piston 47 by the above -- and By removing the bolt 33 for pistons from the upper part, a piston 47 is taken out upwards, check of the 1st seal 31 for pistons used for the seal 51 for the 1st lid and the piston 47 and the 2nd seal 32 for pistons and exchange can carry out easily, and maintainability improves. Especially in the hydraulic elevator in which the 1st hydraulic lifter 5 is installed in a narrow place, since maintenance can be performed from the upper part, check and exchange become easy. Moreover, check and exchange can be similarly performed for the 1st seal 31 for pistons, the 2nd seal 32 for pistons, and the seal 19 for Lamb from the upper part by removing the head 50 for Lamb.

[0040] Next, although the operation of the 3rd oil elevator 1B is explained, since the 1st embodiment, and an operation and an effect are almost the same, a different operation is mainly explained. When going up the 3rd oil elevator 1B, the pressure oil from the oil pressure pump 37 has a direction controlled by the control valve 38, and is supplied to the space Hmb of the oil pressure room Hm of 11B the 3rd cylinder through the feeding-and-discarding hole 21. The pressure oil supplied to Space Hmb acts on the pressure receiving area of the ring part between 2nd Lamb's 17B outer diameter 17b, and the inside diameter 48a of the 2nd hollow pipe 48, elongates 2nd Lamb 17B of the Lamb member 45, and goes up the basket 3 of the 3rd oil elevator 1B.

[0041] At this time, the pressure oil of the space Hmc of the oil pressure room Hm established in the piston 47 bottom with the rise of the Lamb member 45 flows into Space Hmb from the oil pressure pump 37 through Hole 49a. For this reason, the oil pressure pump 37 just comes to carry out discharge of said pressure receiving surface integral of the Lamb member 45, and the amount of discharge is made few and it is made small. Moreover, since said pressure receiving area is made greatly, discharge pressure of the oil pressure pump 37 is made small. Or by enlarging discharge pressure, big lift power can be given to the Lamb member 45, and big laden weight can obtain a hydraulic lift.

[0042] Moreover, the inside diameter room Ams established in the piston 47 bottom with the rise of the Lamb member 45 is extended one by one, and, as for the compression gas poured into the 3rd accumulator 12B, the pressure of the space room Amr and the inside diameter room Ams declines one by one with extension. However, the oil pressure according to the weight of the basket 3 concerning 2nd Lamb 17B is breathed out by the oil pressure room Hm from the oil pressure pump 37. By this, the pressure of oil pressure and compression gas is added according to the weight of a basket 3, it becomes fixed power, and the basket 3 is raised.

[0043] When descending the 3rd oil elevator 1B, the control valve 38 is operated in a downward position, the amount of openings is controlled by the flow control valve 42, as for the pressure oil of the oil pressure room Hm of 11B, the 3rd cylinder of flux is controlled, and 2nd Lamb 17B descends at a fixed speed. Since the return pressure oil produced by this 2nd Lamb 17B descends like the 1st embodiment, receiving compression gas, return pressure oil of the oil pressure room Hm is low-pressure-ized by the pressure of compression gas, and the oil pressure adjusted by the flow control valve 42 has low pressure.

[0044] Furthermore, some return oil of Space Hmb flows into the space Hmc of the oil pressure room Hm established in the piston 47 bottom through Hole 49a with descent of the Lamb member 45. For this reason, return \*\*\*\* of return oil from the space Hmb of the oil pressure room Hm to the oil tank 40 to which only that part serves as small flux and is adjusted by the flow control valve 42 decreases, and it can lessen generating of heat. Furthermore, since the inside diameter room Ams established in the piston 47 bottom with 2nd Lamb's 17B descent contracts one by one and compression gas goes up, It returns, while being able to make 2nd Lamb's 17B descent late with compression gas, and \*\*\*\* is made to low pressure, and the oil tank 40 and the buffer for fall prevention can be made small like the 1st embodiment.

[0045] Next, drawing 4 explains the 4th embodiment of a hydraulic elevator. In addition, the same mark is given to the same functional component as the 1st embodiment and the 3rd embodiment, and explanation is omitted. The 4th oil elevator 1D shown in drawing 4 is formed by the basket 3 of an elevator, the formula hydraulic lifter 5D (henceforth the 4th hydraulic lifter 5D) with 4th built-in accumulator, and the hydraulic system 7. In the 3rd oil elevator 1B, since the 4th oil elevator 1D differs in the structure of the 4th accumulator 12D of the 4th hydraulic lifter 5D, below, it explains this difference.

[0046] In the 3rd accumulator 12B of the 3rd hydraulic lifter 5B, while the 2nd hollow pipe 48 of the Lamb member 45 was fixed to the disk 49, the 2nd hollow pipe 48 and the head 50 for Lamb had dissociated, and compression gas was circulating this separated part. On the other hand, in the 4th accumulator 12D of the 4th hydraulic lifter 5D, while the 3rd hollow pipe 48A of the 1st Lamb member 45A is inserted and connected to the 1st yen board 49A by the lower part side, by the upper part side, it is inserted in the head 50A for the 1st Lamb, and is attached. Moreover, the seal 53 is inserted and attached between the 3rd hollow pipe 48A and the 1st yen board 49A. Moreover, the hole 54 which

opens the space room Amr and the inside diameter room Ams for free passage is formed, and the 3rd hollow pipe 48A is flowing out and carrying out ON of the compression gas. Moreover, the inside diameter size Da of the hole 50a of the head 50A for the 1st Lamb which attaches the 1st lid 25A which is the Lamb part like the 2nd embodiment is opened above the outer diameter size Db of the piston 47 currently arranged face to face.

[0047] Next, about an operation, since it is the same as that of the 2nd embodiment except compression gas being open for free passage through the hole 54 of the 3rd hollow pipe 48A at the space room Amr and the inside diameter room Ams when the 4th hydraulic lifter 5D expands and contracts, explanation is omitted. It can make manufacture and an assembly easy while rigidity of the accumulator [ 4th ] 12D of the 4th hydraulic lifter 5D increases by being inserted in the 1st yen board 49A by the lower part side, and inserting the 3rd hollow pipe 48A in the head 50A for the 1st Lamb by the upper part side.

[0048] drawing 5 explains structure of using for the 4th hydraulic lifter 5D from the 1st hydraulic lifter 5 -- it is an enlarged drawing in part. By drawing 4, the mimetic diagram is used from drawing 1, and an assembly, decomposition, a seal, etc. were not explained in detail. It can perform the seal of pressure oil and compression gas while supporting Lamb's 17 sliding by using the cylinder head 61, the bush 63, the seal 19 for Lamb, the ground 65, and the O ring 67 of an oil pressure cylinder, as each aforementioned hydraulic lifter 5 is shown in drawing 5. Moreover, decomposition is made possible with the bolt, the screw, etc. If a copper system, a resin system, a-less lubricous bush, or a Teflon KOTEINGU axle hole can be used for this bush 63 and said axle hole 34 and they arrange that position to the pressure oil side, as for lubricous \*\*\*\*\*, they are performed and are good for abrasion resistance. Moreover, the enclosure plug 69 which encloses compression gas with Lamb 17 and 17A or the end face board 13 is formed, and compression gas can be enclosed also after installation.

[0049] Although the 4th hydraulic lifter 5D was used for the hydraulic elevator and explained from the 1st hydraulic lifter 5 of this invention, it can use for hydraulic hoisting machinery other than this.

[0050]

[Effect of the Invention] As explained above, since the actuator is arranged in the inside of Lamb of a hydraulic lifter and the compression gas is acting on Lamb continuously, piping, a control means, etc. become unnecessary and this invention is made at a low price with an easy structure. Since compression gas is acting on Lamb continuously, the oil which the oil pressure and \*\*\*\* which are supplied to the load concerning Lamb can be made small, and is returned to an oil tank from a hydraulic lifter can be lessened similarly. When this hydraulic lifter descends, since flow control of return pressure oil decreases, generating of useless heat can be lessened.

[0051] Since an oil pressure pump and an electric motor become small, and useless generation of heat is

lost and an oil tank can also be made small if the above-mentioned formula hydraulic lifter with a built-in accumulator is used for a hydraulic lift, a hydraulic elevator can be installed in a narrow place. Furthermore, an oil pressure pump is low pressure, and since discharge capacity can be made small, it can make noise small while it can attain energy saving. Even when a flow control function cannot be performed with garbage etc. while a hydraulic lift descends, since the compression gas of an accumulator goes up according to descent, Lamb's descent can be made late, the buffer for fall prevention can be made small, and the setting position of a hydraulic elevator can be made small. Moreover, since the piston of compression gas is smaller than the inside diameter of the head for Lamb, it is easily exchangeable from the bottom by checking the seal of the piston which counters by removing the head for Lamb, and packing. Since Lamb is supported with the rail by one side, position \*\*\*\*\* of Lamb and a rail becomes easy, and an axle hole becomes unnecessary and is inexpensive at Lamb.

### [Brief Description of the Drawings]

[Drawing 1] It is a mimetic diagram explaining the 1st oil elevator of the 1st embodiment concerning this invention.

[Drawing 2] It is a mimetic diagram explaining the 2nd oil elevator of the 2nd embodiment concerning this invention.

[Drawing 3] It is a mimetic diagram explaining the 3rd oil elevator of the 3rd embodiment concerning this invention.

[Drawing 4] It is a mimetic diagram explaining the 4th oil elevator of the 4th embodiment concerning this invention.

[Drawing 5] the structure of a hydraulic lifter is explained -- it is an enlarged drawing in part.

[Drawing 6] It is a mimetic diagram explaining the conventional hydraulic elevator.

[Explanations of letters or numerals] 1, 1A, 1B, 1D -- A hydraulic elevator, 3 -- A basket, 5, 5A, 5B, 5D -- A formula hydraulic lifter with a built-in accumulator, 7 -- A hydraulic system, 11, 11A, 11B, 11D -- A cylinder, 12, 12A, 12B, 12D -- Accumulator, 13 -- A end face board, 15 -- A cylinder tube, 17, 17A, 17B -- Lamb, 19 [ -- A lid, 26 / -- The seal for lids, ] -- The seal for Lamb, 21 -- A feeding-and-discarding hole, 23 -- The hole for Lamb, 25 27 -- A hollow pipe, 29 -- A hollow piston, 31 -- The 1st seal for pistons, 32 [ -- A control valve, 40 / -- An oil tank, 42 / -- A flow control valve, 46 / -- A rod, 47 / -- A piston, 48 / -- A hollow pipe, 50 50A / -- The head for Lamb, 50a / -- A hole, Hm / -- An oil pressure room, Ams / -- An inside diameter room, Amr / -- Space room. ] -- The 2nd seal for pistons, 36



-- An electric motor, 37 -- An oil pressure pump, 38

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[Translation done.]